ORIGINAL ARTICLE

Determining Factors of Stroke Preventive Behaviors among Risk Persons in Community, Thailand

Khunphitha Junsevg[1], Amornrat Sangsaikaew[1], Arunrat Utaisang[1], Thisachon Thanyawarathorn[2], Ratsamee Thongsaman[3]

[1] Department of Adult and Aging Nursing, Boromarajonani College of Nursing Nakhon Phanom, Nakhon Phanom University, 48000 Nakhon Phanom, Thailand
[2] Registered Nurse, Senior Professional Level, NONGYAT Tambon Health Promoting Hospital, 48000 Nakhon Phanom, Thailand
[3] Public Health Technical Officer, Senior Professional Level, SANPAN Tambon Health Promoting Hospital, 48000 Nakhon Phanom, Thailand

ABSTRACT

Introduction: Risk perception of stroke and appropriate health behaviors are determining factors of stroke prevention. This study was conducted to determine factors of stroke preventive behaviors in stroke risk groups. **Materials and methods:** This descriptive predictive research was conducted among 158 persons aged over 55 years, susceptible to stroke in 10 years 10% or higher. The subjects were drawn by the purposive sampling method. We collected data during September 2021-Febuary 2022, using questionnaires to explore personal characteristics, stoke knowledge test, stroke perception questionnaire, and preventive behavior assessment form. The data were analyzed by Chi-square and binary logistic regression analysis. **Results:** Factor determining healthy behaviors to reduce stroke risk included stroke knowledge, stroke perception, and presence of chronic diseases. There were 158 patient included in the present study, it was found that the samples are Knowledge about stroke was found to have influence over preventive behaviors against stroke among persons at risk in Nakhon Phanom with statistical significance at .01 with a coefficient increased by 0.48. One more point of knowledge about stroke among the persons at risk caused persons at risk to be 1.6 times more likely to have appropriate preventive behaviors against stroke (OR = 1.62; 95%CI = 1.301, 2.020). Finally, the dominant factor influencing stroke preventive behaviors is stroke knowledge. **Conclusion:** Therefore, interventions are necessary to increase stroke preventive behavior in risk groups by promoting stroke knowledge and awareness of stroke risks.
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Keywords: Stroke knowledge, Stroke preventive behaviors, Risk groups of strokes, Risk Persons in community, Stroke perception

Corresponding Author:
Amornrat Sangsaikaew, MSc
Email: a_sangsaikaew@npu.ac.th
Tel : +66 42-512-196

INTRODUCTION

The incidence of stroke increases with age and doubles for each decade after age 55 (1). Stroke accounts for the second cause of disability and mortality worldwide. At least 13.7 new cases are reported per year (2). Thailand is reported of steady increase in stroke incidence and mortality due to stroke every year. Stroke morbidity increased from 451.39/100,000 in 2016 to 542.54/100,000 in 2019 and stroke mortality increased from 48.13/100,000 in 2016 to 52.97/100,000 (3).

Stroke refers to conditions caused by poor cerebral blood flow, resulting in artery occlusion or rupture, thus leading to brain cell death due to lack of blood and oxygen supply to brain. Stroke patients may suffer from long-term disability, thus likely to leave family members burden of care giving and economic loss for treatments and continued rehabilitation at home (4).

Stroke risk factors are divided into non-modifiable risk factors and modifiable risk factors. The earlier comprises sex, age, race and genetics; the later, the most important cause, consists of non-communicable diseases (NCDs) (i.e., Hypertension, Diabetes, Hyperlipidemia) and health behaviors, which are strong predictors for health outcomes, including sedentary behavior, diet, obesity and metabolic syndrome, alcohol consumption, smoking and stress (1). Obesity has become a major risk factor leading to the increase in the prevalence of cerebrovascular diseases (5). Notably, abdominal obesity, which is caused by the accumulation of visceral fat, has been identified as an independent risk factor for obesity-related diseases (6). The waist-to-height ratio (WHtR) is not only effective indicators of abdominal

obesity, but also more effective parameters predicting risk factors for cerebrovascular diseases (7,8)

Stroke prevention is a critical public health strategy for reducing morbidity and mortality, with improving public knowledge being a key initial step (9). Studies show that stroke knowledge positively correlates with preventive behaviors and predicts health-promoting actions (10). Individuals with non-communicable diseases (NCDs), particularly those aged 55 and older with primary-level education, are at high risk of stroke and often lack sufficient stroke knowledge (11,12). Misperceptions about stroke prevention further hinder appropriate behaviors (13). This group is also characterized by unhealthy lifestyle practices, including poor diet, inadequate physical activity, and low self-perception of stroke susceptibility (14,15).

Therefore, it is also necessary to investigate understanding of stroke knowledge and perception of stroke as well as promote health behaviors among population at risk in a group in heterogenous contexts from different previous studies.

Nakhon Phanom Province is situated in northeastern Thailand, inhabited by a variety of ethnic groups and diversified by belief and specific culture. Most of the inhabitants reside in remote areas and live on agriculture. As for dietary behaviors, they favor strong taste of food, including spicy, sweet and salty flavor, for instance (e.g., Khanomchene (rice noodle in fermented sauce curry), Somtam (papaya salad), Jeawbong (fermented fish with herbs), which are usually cooked with health – ruining ingredients (e.g., sugar, fermented fish sauce, shrimp paste, and monosodium glutamate). Meanwhile, they lack exercise regiments (16). Such unhealthy behaviors lead them to develop NCDs. Nakhon Phanom has been reported of the increasing number of patients with NCDs. According to the stroke screening survey, the individuals over 55 years were at risk of heart attack and stroke (Thai Cardio-Vascular [CV] risk score) at the moderate level (43.58%) and high risk- high risk dangerous (24.81%) (17).

This study aimed to explore factors contributing to stroke preventive behaviors in risk groups living in Nakhon Phanom Province. The associated factors pertained to personal characteristics, stroke–related knowledge, and self-perception of stroke. The findings from this research will be utilized to guide the development of an educational model aimed at raising stroke preventive behaviors, tailored to the lifestyle and cultural context of the Northeastern Thai population. This approach aims to promote health behavior modifications that reduce stroke risk factors among both the general population and high-risk individuals residing in communities within Nakhon Phanom Province and other areas with similar lifestyles and cultural traditions. Furthermore, the results will contribute to policy recommendations designed to reduce the incidence and prevalence of stroke among at-risk elderly populations.

MATERIALS AND METHODS

Conceptual framework

The current research aimed to investigate factors influencing stroke preventive behaviors among a group susceptible to stroke. The study was based on the Breckler (1986)'s perception concept (18) that individuals will modify own behaviors to prevent stroke depends on whether they have stroke knowledge, self-perception of risk of stroke, apprehension and fear of stroke. Literature review suggests that difference of gender, age, level of education, presence of chronic disease, body mass index (BMI), and waist-to-stature ratio (WSR) affect stroke preventive behaviors pertaining to awareness of warning sign, dietary behaviors, physical activity, emotion and stress management and follow-up adherence (Figure 1).

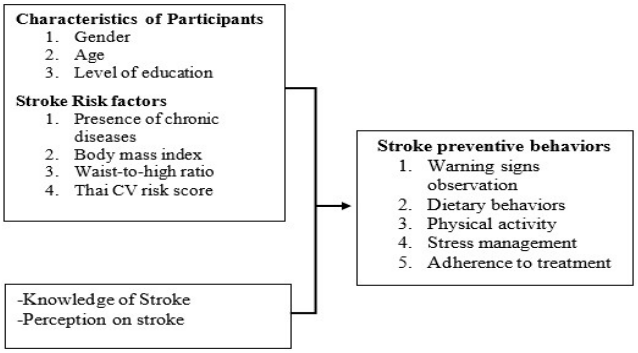

Figure 1: Conceptual Framework

Study design

The current study deployed a cross-sectional design. The research was conducted at two Tambon health promotion hospitals during September 2021-Febuary 2022. The purpose of this study was to investigate factors affecting stroke preventive behaviors of risk groups in Nakhon Phanom Province.

Participants

The population of study consisted of 158 participants aged over 55 years, the population size was calculated by G*power (3.1.9.2), level of reliability established at .05; power of test at .8 (19); the effect size at .19; and r- value between stroke preventive behaviors and stroke knowledge was .326 (20). There were 135 subjects and additionally recruited 27 (20%), thereby gaining 162 in total, diagnosed with one of the NCDs namely hypertension, diabetes and hyperlipidemia. They were susceptible to stroke in 10 years 10% when assessed by Thai CV risk score (21). However, NCDs patients who had complications and inclined to participate in the study were excluded from the study. The factors including personal characteristics, stroke risk factors, stroke knowledge and perception of stroke determined five stroke preventive behaviors namely awareness of warning signs, diet consumption, physical activity, stress management and adherence to follow-up appointments.

Data Collection
After the ethic approval, the researchers underwent data collection. We scanned the list of patients with NCDs who were admitted at two Tambon health promotion hospitals, Nakhon Phanom Province and then selected patients meeting the specified qualifications. The selected subjects were explained the study's objectives and methodology. If willing to participate in the study, they signed a consent form. The researchers approached the subjects and underwent interviews while the subjects were waiting for medical examination. The interview lasted approximately 30 minutes.

Research instrumentation
A validated and structured test was used (22). The test comprises four parts as follow; the first part explores demographic and health characteristic information, including gender, age, marital status, education attainment, occupation, history of chronic diseases and duration of having the diseases, smoking history, alcohol consumption, body weight, height, and BMI.

The second part explores Knowledge test on risk, warning signs and health behaviors in stroke prevention. The test comprised 25 items. A correct answer was scored one point, while the wrong one as well as "not know" answer was offered no score. If the total score was higher than the mean score, it was considered a good category; however, if the total score was equal or lower than the mean score, it was considered poor. The test was responded by patients with hypertension KR 20 = .95 (22). The scores were tested for reliability using Kuder Richardson 20 (KR20), obtaining 0.71.

The third part explores stroke perception. The test comprises 10 items from which the subjects were obliged to select one of the following options: agree, disagree or not sure response from ten items. Agree was scored one point, while disagree and not sure were given no score. If the total score was above the mean score, their stroke perception was assessed to have good knowledge, while those whose score was lower or equal to the mean score were considered to have limited stroke perception. The test was responded by patients with hypertension .71 (22). The Cronbach's alpha coefficient was 0.70 (This level of reliability is adequate for this research objectives).

The last part explores stroke preventive behaviors. The test comprises 25 items with four-scale rating ranging from 0 to 3 points, including never, seldom, sometimes, and always. The subjects were considered adherent to stroke preventive behaviors if their total score was higher than the mean score, while those whose score was lower or equal to the mean score were considered non-adherent. The test was responded by patients with hypertension .87 (22). The Cronbach's alpha coefficient score was 0.83.

Data analysis
Demographic data of the sample was analyzed with descriptive statistics while predictive power of various factors over preventive behaviors against stroke was analyzed with binary logistic regression analysis by the enter method with statistical significance set at .05. Equation accuracy and suitability were tested by the Hosmer and Lemeshow Test.

Ethical Clearance
This study was endorsed and approved by the ethic committee human research protection, Office of Public Health, Nakhon Phanom province, reference number REC016/64, endorsed on September 13, 2021.

RESULTS

The findings were divided into the following three sections: 1) demographic data and health; 2 preventive behaviors against stroke, knowledge about stroke, and perception of stroke; and 3) predictive power of various factors over preventive behaviors against stroke among persons at risk in communities in Nakhon Phanom.

Demographic data and health information
Most of the subjects were female (60.8%), aged over 60 years (59.5%), married (69.6%), receiving low education level (77.8%), practicing agriculture as main occupation (55 %), and non-smoker (8.5%). Two out of three had chronic diseases including hypertension (48.1%) with an average duration of 4.48 years (SD =6.03). Their waist-to-stature ratio (WSR) was ≥ 0.5 (84.8%). Half of the subjects had BMI which might make them susceptible to obesity and stroke diseases. According to Thai CV risk score, the subjects had a high to very high risk of stroke diseases. (Table I)

Table I: Demography and Health of the Participants (n=158)

Variables	n	%
Gender		
Male	62	39.2
Female	96	60.8
Age-Years (= 63.58 S.D. = 8.87)		
< 60	64	40.5
≥ 60	94	59.5
Marital Status		
Married	110	69.6
Divorced/Widow	38	24.1
Single	10	6.3
Educational Level		
Illiteracy	4	2.5
Elementary	123	77.8
High School	24	15.3
High Education	7	4.4
Occupation		
Unemployed	19	12.0
Farmers	88	55.7
Self-Employed Worker	33	20.9
Salaried/Employee	18	11.4

CONTINUE

Table I: Demography and Health of the Participants (n=158) (CONT.)

Variables	n	%
Smoking Status		
No	124	78.5
Currently Smoking	24	15.2
History of Smoking in the Past	10	6.3
Presence of Chronic Diseases		
No	49	31
Yes*	109	69
Hypertension (= 4.48 ปี, S.D. = 6.03)	76	48.1
DM (= 5.17 ปี, S.D. = 8.97)	72	45.6
Hyperlipidemia (= 0.69 ปี, S.D. = 2.00)	17	10.8
Heart Disease (= 0.40 ปี S.D. = 3.24)	5	3.2
Waist-to-Height Ratio (WtHR)		
< 0.5	24	15.2
≥ 0.5	134	84.8
Body Mass Index (= 25.85, S.D. = 5.03)		
Underweight (<18.5 kg/m^2)	6	3.9
Normal (18.5-22.9 kg/m^2)	34	21.5
Overweight (23.0-24.9 kg/m^2)	35	22.2
Obesity (≥25.0 kg/m^2)	83	52.5
Thai CV Risk Score (= 21.55 S.D. = 7.03)		
Moderate (10-19.99%)	69	43.7
High (20-29.99%)	46	29.1
Very High (≥ 30%)	43	27.2

*Each respondent could report more than one disease.

Preventive Behaviors Against Stroke, Knowledge About Stroke, and Perception of Stroke

Most of the sample has inappropriate preventive behaviors against stroke (68.4%) (Mean = 47.53, S.D. = 9.06). Overall, the subjects had a low level of stroke preventive behaviors in relation to warning signs (53.2%), food consumption (51.9%), and exercise (56.3%), and stress management (63.3%) (Table II). Most of the subjects (73.3%) had a high level of adherence to follow-up appointments. Old age, high-very high TCV risk score, good stroke knowledge and high perception of stroke enhanced adherence to stroke preventive behaviors, but no factors influencing stress management behaviors were found. The sample (63.9%) had good knowledge about stroke (Mean = 19.29, S.D. = 4.67) and most of the sample had poor perception of stroke (60.1%) (Mean = 6.08, S.D. = 1.79) as shown in Table II.

Table II: Numbers, Percentages, Mean Scores, and Standard Deviation of Preventive Against Behaviors, Knowledge about Stroke, and Perception of Stroke (n = 158)

Studied Variables	Number	%
Preventive Behaviors Against Stroke		
Appropriate (≥70 points)	50	31.6
Inappropriate (< 70 points)	108	68.4
(= 47.53, S.D. = 9.06, Range = 23.00 – 65.00)		
Knowledge about Stroke		
Poor (≤ mean score)	57	36.1
Good (> mean score)	101	63.9
(= 19.29, S.D. = 4.67, Range = 6.00 – 25.00)		
Perception of Stroke		
Poor (≤ mean score)	95	60.1
Good (> mean score)	63	39.9
(= 6.08, S.D. = 1.79, Range = 0 – 10)		

Predictive Power of Factors over Preventive Behaviors Against Stroke among Persons at Risk in Communities in Nakhon Phanom

Before analyzing factors correlated with preventive behaviors against stroke among persons at risk in communities in Nakhon Phanom, the researcher tested correlations between independent variables with variance inflation factor (VIF) scores. According to test results, a VIF score of less than 10 was found, indicating every independent variable was not correlated or had a low correlation. Therefore, every independent variable can be entered into data analysis. The researcher entered every independent variable in binary logistic regression analysis which explained influence with odd ratios and found gender, age, level of education, personal illnesses, BMI, WtHR, Thai CV Risk Score, knowledge about stroke, and perception of stroke were able to co-predict preventive behaviors against stroke among persons at risk in Nakhon Phanom at 37.8 percent (Negelkerke R2 = .378). In addition, this model was able to predict the number of persons with proper preventive behaviors against stroke at 72.8 percent (Overall Percentage = 72.8%). Knowledge about stroke was found to have influence over preventive behaviors against stroke among persons at risk in Nakhon Phanom with statistical significance at .01 with a coefficient increased by 0.48. One more point of knowledge about stroke among the persons at risk caused persons at risk to be 1.6 times more likely to have appropriate preventive behaviors against stroke (OR = 1.62; 95%CI = 1.301, 2.020).

Gender, age, level of education, personal illnesses, BMI, WtHR, Thai CV Risk Score, and perception of stroke were unable to predict preventive behaviors against stroke among persons at risk in communities in Nakhon Phanom. In addition, this study tested the model's suitability with the Hosmer and Lemeshow Test with a result of 0.66 (p= .195) as shown in Table III (Table III).

Table III: Factors Associated with Adherence on Stroke Preventive Behaviors Using Logistic Regression Analysis (n=158)

Variable	B	OR	95%CI		p value
			Lower	Upper	
Gender (Male Ref.)					
Female	-0.38	0.68	0.29	1.59	0.378
Age	0.01	1.01	0.94	1.09	0.745
Level of Education					
Elementary	-1.27	0.28	0.01	10.64	0.493
High School	-1.89	0.15	0.00	6.89	0.332
High Education (Illiteracy Ref.)	-1.81	0.16	0.00	9.37	0.381
Chronic Diseases (No Ref.)					
Yes	0.66	1.94	0.78	4.79	0.152
BMI	0.06	1.06	0.96	1.17	0.260
WHtR (≥ 0.5 Ref.)					
< 0.5	0.59	1.81	0.59	5.47	0.294
TCV Risk Score	-0.05	0.95	0.88	1.03	0.202
Stroke Knowledge	0.48	1.62	1.30	2.02	0.000**
Stroke Perception	-0.11	0.89	0.66	1.21	0.476

OR: odds ratio, CI: Confidence Interval, *p <.05, **p <.01, Ref. = Reference group, Overall Percentage = 72.8% Hosmer & Lemeshow test = .660, Cox & Snell R^2 = .270, Negelkerke R^2 = .378

DISCUSSION

Most of the sample was female and aged 60 years and up (59.5%). Most of the sample had an overweight and obese BMI at a mean of 25.85 kg/m2 (SD = 5.03). The sample had a waist-to-height ratio (WtHR) over 0.5 (84.8%). Hypertension was the most common personal illness found in the sample, followed by diabetes. More than half of the sample was at high-very high risk of stroke (56.3%). Stroke risk increased with age due to loss of flexibility in arteries throughout the body, which increases total peripheral resistance, resulting in hypertension. Hypertension was significantly associated with all stroke as shown in a study which found persons with history of hypertension (54%) to subsequently have stroke. In addition, patients with diabetes were twice as likely as an ordinary person to have a stroke (1). Persons at risk who have multiple co-morbidities were at greater risk of a stroke. Moreover, menopausal women have sex hormone changes, causing abdominal fat accumulation and a higher waist-to-hip ratio (23). Obesity is correlated with stroke risk factors such as hypertension (24). Accumulation of visceral adiposity is the major contributor to risk, more than overall increases in weight as indicated by BMI (1). This was consistent with a study on anthropometric measurements for central obesity and found patients with healthy BMI and WHtR ≥ 0.5 to have significantly higher cardiometabolic risk factors compared to the group with healthy BMI and WHtR below 0.5 (25). Moreover, a study on INTERSTROKE found waist-to-hip ratios to be correlated with stroke risk, though BMI was not (23). In addition, a study found elementary level of education and old age to be potential barriers to learning and access to health data, which had effects on health behavior performance causing persons with an education level below secondary education and old age to be at greater risk of stroke. Similarly, a study on stroke prevention knowledge and behaviors of stroke patients before illness found level of education to be correlated with stroke prevention knowledge (14). In addition, Hickey et al. (26) found older adults with a primary level of education to be unable to identify risk factors and warning signs of stroke.

Stroke Preventive Behaviors and Associated Factors

The results show that the majority of persons at risk had poor stroke prevention behaviors. Knowledge about stroke had a greater effect on preventive behaviors against stroke when compared to persons with low knowledge about the disease, which was consistent with the hypothesis and supported the concept of Breckler (18) who explained a person who received information will learn, followed by becoming aware. This consisted of knowledge, understanding, and perception of a person's feelings to one thing, causing the person to choose to perform behaviors. The findings in this study are consistent with many previous studies which found to have influenced stroke preventive behaviors (2,14,27). Similarly, a study on factors with effects on preventive behaviors against stroke among hypertensive patients in Indonesia found most of the patients to have low levels of knowledge and awareness of stroke. More than half of the sample had poor stroke prevention behaviors (13). Most of the sample was explained to have personal illnesses and were checked at appointments regularly to follow-up on treatment outcomes, causing the sample to receive information from healthcare personnel about practices to control blood pressure, blood glucose, and blood cholesterol levels in order to prevent complications by eating foods with low sodium and fat, avoiding sweet foods and beverages, eating more vegetables and fruits, exercising regularly, relaxing, taking medications according to doctors' orders, and coming to be examined at appointments every time, all of which were healthy behaviors that are primary stroke prevention (1). Currently, patients have multiple sources of information, media, and knowledge about stroke such as advertisement signs, shows, radios, televisions, and online media. This was consistent with a study conducted on K of older adults at risk in Chiang Mai, which found the sample to have K at a high level and found sources of stroke knowledge to be mostly from healthcare personnel and television (28). At the same time, the results from a survey on knowledge about stroke in many countries found ordinary people without stroke risks to have knowledge about stroke at a low level (29,30). The findings from this study revealed knowledge about stroke had influence over preventive behaviors against stroke among persons at risk in communities in Nakhon Phanom with statistical significance at .01 (OR = 1.62; 95%CI = 1.301, 2.020). This can be explained by how persons at risk with one more point of knowledge about stroke were 1.6 times more likely to have appropriate preventive behaviors against stroke. The findings were different from a study conducted by Pothiban & Srirat (28) who found knowledge about stroke to not be correlated with preventive behaviors against stroke among persons at risk aged 60 years and up.

Nevertheless, this study found gender, age, level of education, and personal illnesses to be unable to predict preventive behaviors against stroke from persons at risk in communities in Nakhon Phanom. This may be because most of the sample was elderly (59.5%), female (60.8%), had an elementary level of education (77.8%), and personal illnesses (69%). The most commonly encountered personal illnesses were hypertension (48.1%), followed by diabetes (45.6%). The sample was examined to follow-up on blood pressure and blood glucose levels at every appointment and received medications to take daily. In addition, most people in northeastern communities believed and trusted healthcare providers and wanted to know about blood glucose and blood pressure levels, causing the sample to follow instructions or recommendations from healthcare personnel strictly. This was consistent with a study conducted by Pesungnoen et al. (31) who found

patients at risk of stroke to have treatment follow-up behaviors at a high level. Moreover, a study conducted by Sangsaikaew et al. (32) found hypertensive older adults to have adherence to medications. Therefore, elderly female persons at risk with education at the secondary education level with chronic non-communicable diseases in this study were unable to predict preventive behaviors against stroke among persons at risk in communities in Nakhon Phanom.

In this study, BMI, WtHR, Thai CV Risk Score, and perception of stroke were found to be unable to predict preventive behaviors against stroke among persons at risk in communities in Nakhon Phanom. This may have been because patients lack a perception of personal stroke risks even though most of the sample had BMI exceeding standards 974.7%), WtHR at 0.5 and up (84.8%), and annual TCV risk assessment conducted by personnel according to the Ministry of Public Health's policy. In this study, most of the sample was found to have TCV scores with risks at a high-to-dangerously high level (56.3%). However, the sample did not assess stroke risks personally. Advice from healthcare personnel focused on health behaviors to control personal illnesses, dietary intake, exercise, weight loss, and medication adherence to control blood glucose and blood pressure levels (33,34). However, patients received little knowledge specific to stroke, causing patients to have low perception of stroke (60.1) and old familiar behaviors which may have prevented patients from appropriate control of modifiable stroke factors. The sample was used to eating sticky rice and foods that are spicy, sweet, and salty such as Khao Pun Nam Nua, Som Tam, Jaew Bong, and the sample usually flavored food with sugar, fermented fish sauce, fish paste, and monosodium glutamate. Therefore, modifying dietary behaviors to prevent stroke was difficult. For example, reducing seasonings would cause food to be bland and not savory. In addition, most of the sample had agricultural occupations (55.7%). Therefore, the sample may have understood work and occupations as physical movement and perceived themselves as having exercised. This was consistent with a study conducted by Jittanoon et al. (12) who found persons at risk of stroke to have the lowest mean scores for exercise behaviors due to lack of time and perception of labor as exercise.

Limitations of the Study

This study is a cross-sectional study. Data was collected from only two community healthcare service units and a small sample. Therefore, there may be limitations in using the findings to refer to populations of persons at risk of stroke overall and in persons at risk in different contexts from this study.

CONCLUSION

Most of the sample had poor preventive behaviors against stroke while adhering to examinations at appointments. Personal characteristics related to preventive behaviors against stroke are age and high-very high TCV risk score. The dominant factor influencing stroke preventive behaviors is stroke knowledge. Therefore, interventions are necessary to increase stroke preventive behavior in risk groups by promoting stroke knowledge and awareness of stroke risks.

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